

What is claimed is:

- 1 1. A method for displaying a predictively coded compressed video signal
2 in a reverse time sequence comprising the steps of:
- 3 decoding and storing any I-frames and P-frames from a first group of pictures
4 (GOP) upon initiation of a reverse play command; and
- 5 after storing the decoded I-frames and P-frames from the first GOP, displaying
6 video images from the first GOP in the reverse time sequence, including the steps of:
- 7 decoding any bidirectionally predictively encoded frames (B-frames)
8 using the stored I-frames and P-frames and displaying the B-frames as they are
9 decoded;
- 10 displaying the stored I-frames and P-frames of the first GOP as they
11 are encountered in the reverse time sequence; and
- 12 while displaying the I-frames and the P-frames, decoding and storing
13 respective I-frames and P-frames from a second GOP, following the first GOP in the
14 reverse time sequence.

- 1 2. A method according to claim 1 wherein:
- 2 the step of decoding and storing the I-frames and P-frames includes the step of
3 downsampling the decoded I-frames and P-frames to produce respective downsampled I-
4 frames and P-frames and storing the downsampled I-frames and P-frames;
- 5 the step of decoding the B-frames includes the step of filtering the decoded B-
6 frames to display a reduced-resolution image; and
- 7 the step of displaying the I-frames and the P-frames includes the step of
8 upsampling the stored I-frames and P-frames to provide respective reduced-resolution images
9 for display.

1 3. A method according to claim 1, wherein the predictively coded
2 compressed video signal is an MPEG compressed video signal and the steps of decoding I-
3 frames and P-frames include the step of applying an MPEG decoding process.

1 4. A method for displaying an MPEG coded compressed video signal in a
2 reverse time sequence comprising the steps of:

3 retrieving a first group of pictures (GOP) upon initiation of a reverse play
4 command, the retrieved first GOP being the GOP displayed immediately preceding the
5 command;

6 decoding any I-frames and P-frames of the first GOP and storing them in a
7 memory;

8 displaying the decoded I-frames and P-frames of the first GOP as the I-frames
9 and P-frames are encountered in the reverse time sequence;

10 constructing and displaying any B frames of the first GOP as the B-frames are
11 encountered in the reverse time sequence; and

12 decoding I-frames and P frames of a second GOP and storing the decoded I-
13 frames and P-frames of the second GOP in the memory, the second GOP being a next
14 preceding GOP, wherein each I-frame and P-frame of the second GOP is decoded while a
15 respective one of the I-frames and P-frames of the first GOP is being displayed.

1 5. A method according to claim 4 wherein:

2 the step of decoding and storing the I-frames and P-frames of the first GOP
3 includes the step of downsampling the decoded I-frames and P-frames of the first GOP to
4 produce downsampled key frames and storing the downsampled key frames;

5 the step of decoding the B-frames includes the step of filtering the decoded B-
6 frames to display a reduced-resolution image; and

105027 "545" 1001

7 the step of displaying the I-frames and the P-frames includes the step of
8 upsampling the stored I-frames and P-frames to display respective reduced-resolution images.

1 6. Apparatus which displays a predictively coded compressed video signal
2 in a reverse time sequence comprising:

3 a video decoder which decodes intra-coded frames (I-frames) and predictively
4 coded frames (P-frames) from a first group of pictures (GOP) upon initiation of a reverse
5 play command;

6 a memory into which the video decoder stores the decoded I-frames and P-
7 frames of the first GOP;

8 means for displaying a frame stored in memory while the I-frames and P-
9 frames of the first GOP are decoded; and

10 a controller that controls the video decoder, the memory and the means for
11 displaying such that, after the decoded I-frames and P-frames of the first GOP have been
12 stored, the controller:

13 a) controls the video decoder to decode bidirectionally predictively
14 encoded frames (B-frames) using the stored key frames and controls the means for
15 displaying to display the B-frames as they are decoded;

16 b) controls the means for displaying to display the I-frames and P-
17 frames from the memory as they are encountered in the reverse time sequence; and

18 c) controls the decoder and the memory to decode and store I-frames
19 and P-frames from a second GOP, following the first GOP in the reverse time
20 sequence, while respective ones of the I-frames and P-frames of the first GOP are
21 displayed.

1 7. Apparatus according to claim 6 further including:

2 a filter, coupled to the decoder for generating respective reduced-resolution
3 versions of the decoded I-frames, P-frames and B-frames; and

4 a downsampler which decimates the reduced-resolution versions of the
5 decoded I-frames and P-frames before the I-frames and P-frames are stored in the memory.

1 8. Apparatus for displaying a predictively coded compressed video signal
2 in a reverse time sequence comprising:

3 means for decoding and storing any I-frames and P-frames from a first group
4 of pictures (GOP) upon initiation of a reverse play command; and

5 means for displaying video images from the first GOP in the reverse time
6 sequence, including:

7 means for decoding any bidirectionally predictively encoded frames (B-
8 frames) using the stored I-frames and P-frames and for displaying the B-frames as they are
9 decoded;

10 means for displaying the stored I-frames and P-frames of the first GOP
11 as they are encountered in the reverse time sequence; and

12 means for decoding and storing I-frames and P-frames from a second
13 GOP, following the first GOP in the reverse time sequence, while the means for displaying
14 the stored I-frames and P-frames displays respective ones of the I-frames and the P-frames of
15 the first GOP.

1 9. Apparatus according to claim 8 wherein:

2 the means for decoding and storing the I-frames and P-frames includes means
3 for downsampling the decoded I-frames and P-frames to produce respective downsampled I-
4 frames and P-frames and means for storing the downsampled I-frames and P-frames;

5 the means for decoding the B-frames includes filtering means for filtering the
6 decoded B-frames to display a reduced-resolution image; and

7 means for displaying the I-frames and the P-frames includes upsampling
8 means for upsampling the stored downsampled I-frames and P-frames to provide respective
9 reduced-resolution images for display.

1 10. A computer-readable carrier including computer program instructions
2 that cause a computer to perform a method of displaying an MPEG coded compressed video
3 signal in a reverse time sequence, the method comprising the steps of:

4 retrieving a first group of pictures (GOP) upon initiation of a reverse play
5 command, the retrieved first GOP being the GOP displayed immediately preceding the
6 command;

7 decoding any I-frames and P-frames of the first GOP and storing them in a
8 memory;

9 displaying the decoded I-frames and P-frames of the first GOP as the I-frames
10 and P-frames are encountered in the reverse time sequence;

11 decoding and displaying any B frames of the first GOP as the B-frames are
12 encountered in the reverse time sequence; and

13 decoding I-frames and P frames of a second GOP and storing the decoded I-
14 frames and P-frames of the second GOP in the memory, the second GOP being the next
15 preceding GOP, wherein each I-frame and P-frame of the second GOP is decoded while a
16 respective one of the I-frames and P-frames of the first GOP are being displayed.

TOP SECRET S4S1001